Technology Opportunity

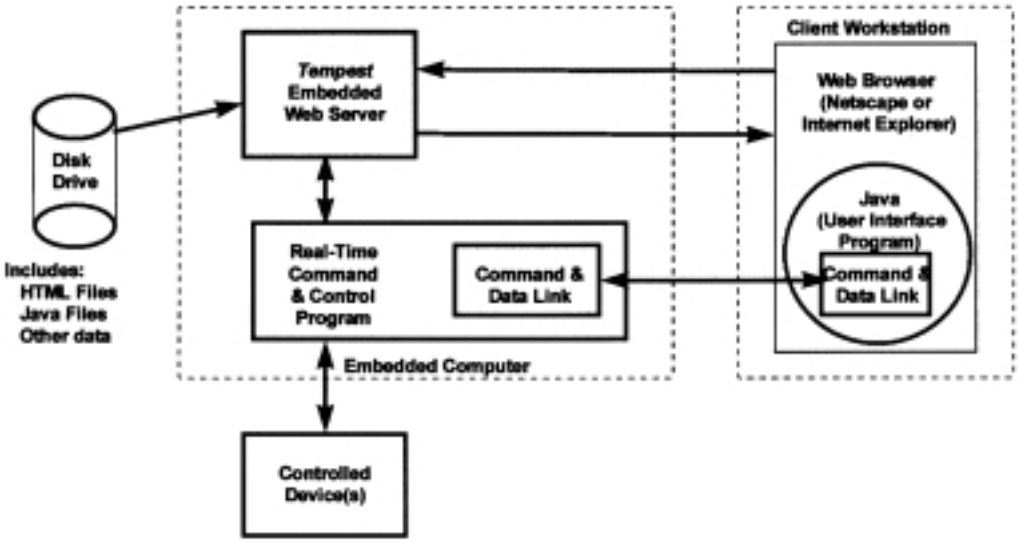
Tempest: Embedded, Real-Time Server Software

The National Aeronautics and Space Administration (NASA) seeks to transfer technology used to create Tempest, a real-time embedded web server. Tempest enables almost any real-time application to be remotely controlled/monitored over the Internet or an Intranet using nothing more than a standard web browser.

The Technology

Tempest was created to provide Internet/Intranet connectivity to real-time, embedded applications. It was the first HTTP server of its kind for real-time embedded systems. This is a unique marriage of World Wide Web technology and Embedded Systems technology. The result is Embedded Web Technology (EWT). In addition to many standard Web functions, Tempest has the following features:

- Compact footprint, as small as 34 KB, necessary in real-time software.
- Custom <TEMPEST...> dynamic HTML tags for snapshot views of the real-time operating system and application events.
- Command line options, ASCII configuration files, logging, debugging, security layer.
- Runs as prioritized task under multi-tasking kernels. Intranet transaction have been clocked at 3–4 msecs.
- VxWorks version of Tempest currently runs on Motorola 680x0 and PowerPCs.
- Java version of Tempest runs on a wide variety of operating systems.



Benefits

Tempest saves significant time and money in the software development lifecycle by enabling the real-time software developer to use standard COTS products from the Internet. Some examples:

- Java. Graphic User Interfaces (GUIs) are easily written in the form of Java applets that can be used to monitor and control a device.
- CORBA or DCOM technology frees the real-time software application designer from developing custom communication layers between processors.
- Streaming Audio/Video provides alternate methods of delivering information to the end user.
- VRML provides interactive 3-D environment for training and/or maintenance.

Tempest drops easily into both new and legacy embedded applications.

Potential Commercial Uses

- In production, remote monitor/control of production line equipment.
- In building management, remote monitor/control of security, environment (eg., HVAC, fire, elevator), etc.
- In offices, remote monitor/control of printers, copiers, fax machines, etc.
- In aerospace, remote monitor/control of instruments in flight.
- In medicine, remote monitoring of patients at home.
- In education, remote monitor/control of scientific experiments by students. This technology is currently being used in the Virtual Interactive Classroom (VIC) at NASA Glenn Research Center. The VIC can be found online at http://vic.grc.nasa.gov.

Options for Commercialization

EWT/Tempest is being transferred to industry via workshops, presentations and seminars. User manuals and design manuals are provided. Source code and consulting time are available.

A bill of materials and software can be supplied to any organization wishing to build scientific equipment that has already been developed in-house for use over the internet in the VIC.

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For more information on Tempest, visit the home page at http://vic.grc.nasa.gov.

Key Words

Software
Embedded
Real-Time
Web Server
HTTP
Internet
Intranet
Remote control
Remote monitor

Reference

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